Determinants And Effects Of Innovation On The Firm Level: An Empirical Investigation

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Abstract

In highly competitive market conditions, it is vital to innovate for the firms in order to survive. The profitability, market share, consumer satisfaction and global competitiveness of the firms mainly depend on their competency of the production of the successful innovations providing for the firm competitive advantage. In this context, main aim of the study is to investigate the effects and determinants of the innovations in the firm level by considering a firm operating in white goods sector in Turkey. Main result of the study is that innovations have important effects on performance indicator of the firm. For this reason, firms have to focus on the production of the innovations providing sustainable competitiveness and profitability by implementing appropriate policies.

Key Words: *Determinants of Innovation, Competitiveness, Competitive Advantage*

JEL Classification: *O31, R11, R12*

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1. Introduction

The competition in the global economy is getting sharper for the firms and countries. Under these conditions, it is vital to innovate for the firms in order to survive. The profitability, market share, consumer satisfaction and global competitiveness of the firms mainly depend on their competency of the production of the successful innovations providing for the firm competitive advantage. In the study, we aim to investigate the effects and determinants of the innovations in the firm level by considering a firm operating in white goods sector in Turkey. In order to achieve of the aim of the study, we first, analyse the increasing role and effects of innovation for the firms, after that we investigate the determinants of innovation in the firm level by considering innovation literature and the innovation models. Finally we surveyed in a firm operating in the white goods sector in Turkey to understand the determinants and effects of innovation on the firm level.

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2.Increasing Role And Effects of Innovation For Firms

Technological change and innovation have become important factors affecting both firms and countries (Marinova and Phillimore, 2003; Amara and Landryi 2005; Cooper, 1990). Utterback (1971) stated that technological innovation has had an impact on international trade, industry structure, formation and development of new firms and industries, and the growth and the survival of existing firms and industries. Hannay (1980) stated that technological change is one of the most fundamental and powerful forces affecting both the economy and society. Damanpour et al. (2009) stated that a firm's ability to acquire and exploit external knowledge is often critical to achieving and sustaining a competitive advantage. OECD and EUROSTAT (2005:46) defined innovation as follows:

“An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations”.

OECD and EUROSTAT (2005:47-51) classified innovation types as follows:

- i. *“A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics”.*
- ii. *“A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software”.*
- iii. *“A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing”.*
- iv. *“An organisational innovation is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations”.*

OECD and EUROSTAT (2005) stated that the minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations. The ultimate reason why firms innovate is to improve firm performance and profitability by gaining a competitive advantage over its competitors and increasing consumer satisfaction in terms of better quality, price, value, innovations by enhancing productivity, reducing costs, product differentiation and supplying new unique innovative values for the market and customers (Also see, Acs and Audretsch 1988; Bhattacharya and Bloch 2004). Each innovation contributes firms performance in different way defined as follows (OECD and EUROSTAT (2005:47-51):

- i. *“Product innovations covering both goods and services can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. Product innovations include both the introduction of new goods and services and significant improvements in the functional or user characteristics of existing goods and services”.*

- ii. *“Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products”.*
- iii. *“Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm’s product on the market, with the objective of increasing the firm’s sales”.*
- iv. *“Organisational innovations can be intended to increase a firm’s performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to nontradable assets (such as non-codified external knowledge) or reducing costs of supplies”.*

OECD and EUROSTAT (2005) stated that firms can engage in innovation for many reasons. Firms’ targets may involve products, markets, efficiency, quality or the ability to learn and to implement changes. Firms also aim to have competitive advantage in terms of innovation, competitiveness and market share against their competitors and aim to increase consumer satisfaction by increasing new innovations.

3. Determinants of Innovation in The Firm Level

Narayanan (2001) stated that primary objective of technology management should be the creation of value for a firm. Value creation is tied to the competitive advantages that a firm can create in the marketplace or more precisely in the firm’s competitive domains. Narayanan defined that management of technology focuses on the principles of strategy and organization involved in technology choices, guided by the purpose of creating value for the investors. Liu et al. (2009) found that the firm's technological-innovation-based strategic capabilities were neither influenced by technological resources, nor by innovation resources, but by organizational culture, human resources and organizational structure, among which human resources is the most dynamic one (Also see, Cohen and Levinthal 1989; Dosi 1988; Freel 2003; Vega-Jurado et al., 2008). Schilling (2008) stated that it is useful to begin with some standard tools of strategic analysis for analysing the external and internal environment of the firm to assess the firm’s current position in the marketplace. Innovation is vital for the firms in order to survive in competitive environment. For this reason, firms have to analyse both market conditions, competitors and customer needs to develop better innovations. Jesús and Manuel de la Fuente (2003) stated that the combination of the resources and internal factors can determine the type of innovative process used by the firm. The evolutionary theory is essential for carrying out a specification of the process by means of certain innovative characteristics. These are basic parameters that give evidence of the inadequacy of the traditional model concerning innovation that only analyses superficial factors. The integration of the innovative characteristics into an explanatory model of the innovative process is proposed with the aim of clarifying the analysis in the Figure-1.

Source: Galende Jesús, Manuel de la Fuente Juan (2003), "Internal factors determining a firm's innovative behaviour", *Research Policy*, Volume 32, Issue 5, May 2003, Pages 715-736,

Figure 1: An Explanatory Model Of The Innovative Proces

Firms aim to gain competitive advantages against their competitors by innovating. The table-1 shows the factors relating to the objectives and effects of innovation types. Product and marketing innovations are mainly interested in competition, demand and markets, process and organisational innovations mainly interested in production and delivery and also workplace organizations.

Table 1: Factors Relating To The Objectives And Effects Of Innovation

Relevant for:	Product innovations	Process innovations	Organisational innovations	Marketing innovations
Competition, demand and markets				
Replace products being phased out	*			
Increase range of goods and services	*			
Develop environment-friendly products	*			
Increase or maintain market share	*			*
Enter new markets	*			*
Increase visibility or exposure for products				*
Reduced time to respond to customer needs		*	*	
Production and delivery				
Improve quality of goods and services	*	*	*	
Improve flexibility of production or service provision		*	*	
Increase capacity of production or service provision		*	*	
Reduce unit labour costs		*	*	
Reduce consumption of materials and energy	*	*	*	
Reduce product design costs		*	*	
Reduce production lead times		*	*	
Achieve industry technical standards	*	*	*	
Reduce operating costs for service provision		*	*	
Increase efficiency or speed of supplying and/or delivering goods or services		*	*	
Improve IT capabilities		*	*	
Workplace organisation				
Improve communication and interaction among different business activities			*	
Increase sharing or transferring of knowledge with other organisations			*	
Increase the ability to adapt to different client demands			*	*
Develop stronger relationships with customers			*	*
Improve working conditions		*	*	
Other				

Source: OECD and EUROSTAT (2005), Oslo Manual Guidelines For Collecting And Interpreting Innovation Data, Third Edition, OECD and EUROSTAT Publication, p.108

Tabel 2: Factors Hampering Innovation Activities

Relevant for:	Product innovations	Process innovations	Organisational innovations	Marketing innovations
Cost factors:				
Excessive perceived risks	*	*	*	*
Cost too high	*	*	*	*
Lack of funds within the enterprise	*	*	*	*
Lack of finance from sources outside the enterprise:				
Venture capital	*	*	*	*
Public sources of funding	*	*	*	*
Knowledge factors:				
Innovation potential (R&D, design, etc.) insufficient	*	*		*
Lack of qualified personnel:				
Within the enterprise	*	*		*
In the labour market	*	*		*
Lack of information on technology	*	*		
Lack of information on markets	*			*
Deficiencies in the availability of external services	*	*	*	*
Difficulty in finding co-operation partners for:				
Product or process development	*	*		
Marketing partnerships				*
Organisational rigidities within the enterprise:				
Attitude of personnel towards change	*	*	*	*
Attitude of managers towards change	*	*	*	*
Managerial structure of enterprise	*	*	*	*
Inability to devote staff to innovation activity due to production requirements	*	*		
Market factors:				
Uncertain demand for innovative goods or services	*			*
Potential market dominated by established enterprises	*			*
Institutional factors:				
Lack of infrastructure	*	*		*
Weakness of property rights	*			*
Legislation, regulations, standards, taxation	*	*		*
Other reasons for not innovating:				
No need to innovate due to earlier innovations	*	*	*	*
No need because of lack of demand for innovations	*			*

Source: OECD and EUROSTAT (2005), Oslo Manual Guidelines For Collecting And Interpreting Innovation Data, Third Edition, OECD and EUROSTAT Publication, p.113

There are many factors affecting innovation in the firm level in both negatively and positively. OECD and EUROSTAT (2005) argued that innovation activities can be hampered or affected negatively by a number of internal and external factors in the firm level. These include economic factors, such as high costs or lack of demand, factors specific to an enterprise, such as lack of skilled personnel or knowledge, and legal factors, such as regulations or tax rules, see in detail in Table-2. Figure-2 shows internal determinants of the innovative process. Tangible and intangible factors, strategies and innovative processes have important interrelationships in order to develop innovations. Fariborz et al. (2009) stated that the impact of innovation on organizational performance depends on compositions of innovation types over time. Narayanan (2001) stated that four major types of innovations incremental, modular, architectural and radical. Edquist and Hommen (1999) claimed that innovation policies can be classified as demand-side oriented or supply-side oriented.

In the literature, there are many factors affecting innovations (Erturk, 2009). Table-3 shows the internal factors and innovation. The size factor affects the innovations both large and small size effects, empirical studies supports this effects in different ways. The debt factor mainly affects negatively because of risk and information asymmetries. Human resources affects positively because of qualification and experience. Commercial resources affects positively because of reputation, image, complementary resources, information. Organisational resources affects positively because of co-ordination, communication, integration and absorptive capacity. On the other hand, diversification affects negatively because of the formal and financial controls. Finally, internationalisation mainly affects positively because of competitiveness and market.

Jesús and Manuel de la Fuente (2003) stated *“The combination of the resources and internal factors can determine the type of innovative process used by the firm. The evolutionary theory is essential for carrying out a specification of the process by means of certain innovative characteristics”*

The technological innovation process are analysed by the six generations of models, namely the black box model; linear models; interactive models; system models, including networks and linkages; technology learning and evolutionary models; and innovative milieu (Marinova and Phillimore, 2003).

Figure-6 shows the comparison of ‘integrated’ models of determinants of innovation. Souitaris (2002) demonstrates that *“a comparative presentation of models in the literature that attempts to integrate the determinants of innovation. Common classes of factors appear throughout the different models focusing on ‘context’ (external environment and firm’s profile), ‘strategy’, ‘scanning external information’ and ‘organisational structure. Despite the apparent similarity of integrative models of determinants of innovation at the aggregated level, there is more variety when it comes to operationalisation and empirical testing’.*

Source: Galende Jesús, Manuel De La Fuente Juan (2003), "Internal Factors Determining A Firm's Innovative Behaviour", *Research Policy*, Volume 32, Issue 5, May 2003, Pages 715-736,

Figure 2 : Internal determinants of the innovative process

Table 3: Internal Factors and Innovation

Factor	Theoretical Arguments
Size	Large : Economies, risk, market, appropriation, Small: Flexibility, communication, specialization, informal controls
Debt	Negative: Specificity, risk, information asymmetries
Human resources	Positive: Qualification, experience
Commercial Resources	Positive: Reputation, image, complementary resources, information
Organisational resources	Positive: Coordination, communication, integration, absorptive capacity
Diversification	Negative: Formal and Financial Controls
Internationalisation	Pozitive: Competitiveness, market

Source: Galende Jesús, Manuel de la Fuente Juan (2003), "Internal factors determining a firm's innovative behaviour", *Research Policy*, Volume 32, Issue 5, May 2003, Pages 715-736,

OECD and EUROSTAT (2005) claimed that "the ability of enterprises to appropriate the gains from their innovation activities also affects innovation. On the other hand, an optimum level protection between the copyright of innovators and benefit of society must be regulated. Neither innovators lose their enthusiasm to innovate nor do they transform into a monopoly damaging benefit of society".

Table-4 shows the portfolio model of determinants of innovation. Its presentation that follows covers two types of sources: (a) conceptual works that introduced the general themes and proposed their relationship with firm innovativeness and (b) studies (mainly empirical) that associated innovation rate with specific indicators, within the general themes (Souitaris, 2002).

Table 4: The Portfolio Model Of Determinants Of Innovation

Source: Souitaris Vangelis (2002). "Technological Trajectories As Moderators Of Firm-Level Determinants Of Innovation", Research Policy, Volume 31, Issue 6, August, Pages 877-898,

4. Empirical Investigation: Data, Methodology and Results

In the empirical section of the study, it is aimed to investigate the effects and determinants of the innovation in a firm operating the white goods sector in Turkey.

Data obtained the firm by surveying and the methodology depends on the basic statistical analysis. Table-5 shows the result of the survey on the effects and determinants of innovation in white goods firm in Turkey. According to the results, innovation has important effect on the firm's performance indicators. On the other hand, determinants of innovations given in Table-5 have important role to innovate. Especially, sufficient research-development budget and financing and changing consumer needs have important role in determinants of innovation for this firm.

Table 5: A Survey on The Effects And Determinants Of Innovation In White Goods Firm In Turkey

Part A) The Contribution Of Innovation On The Firm's Performance Indicators

Contribution rate Indicators	%0-19	%20-39	%40-59	%60-79	%80-100
4 Costs			X		
5 Productivity/Efficiency				X	
6 Profitability			X		
7 Competitiveness				X	
8 Consumer Satisfaction					X
9 Employee Satisfaction			X		
10 Market Share in Turkey				X	

Part B) The Determinants of Innovation In the Firm Level

	%0-19	%20-39	%40-59	%60-79	%80-100
Support Of Top Management			X		
Innovative Organizational Culture				X	
Sufficient Qualified Human Capital				X	
Sufficient Research-Development Budget And Financing					X
Sufficient Research-Development Infrastructure				X	
International Cooperation			X		
Competitive Pressure From Market And Competitors				X	
Changing Consumer Needs					X

Source: Author Survey Results

5. Conclusions

The competition in the global economy is getting sharper for the firms and countries. Under these conditions, it is vital to innovate for the firms in order to survive. The profitability, market share, consumer satisfaction and global competitiveness of the firms mainly depend on their competency of the production of the successful innovations providing for the firm competitive advantage. In the study, we aim to investigate the effects and determinants of the innovations in the firm level by considering a firm operating in white goods sector in Turkey.

Main results of the study are that Innovation have important effects on the costs, productivity/efficiency, profitability, competitiveness, consumer satisfaction, employee satisfaction, market share in Turkey of the firm analysed. Main determinants of the innovations mainly are the support of top management, innovative organizational culture, sufficient qualified human capital, sufficient research-development budget and financing, sufficient research-development infrastructure, international cooperation, competitive pressure from market and competitors and changing consumer needs.

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